Sample Tasks

Investigative practical work
Microscopic examination
Dissection
Biological drawing

20 & 26 June 2009

Task type (a) – Investigative practical work

Criteria for assessing the ability to organise and perform practical work :

(i) The procedure for practical work is carried out safely.

(ii) Work is done in an organised and efficient way.

(iii) The apparatus is handled competently.

(iv) Instruments are used in appropriate ways to make accurate readings and measurements

(v) Work area is kept neat and tidy.

- Can be an investigation or a "recipe type" practical work
- Cannot be used for assessing area B (report writing) if "recipe type" practical work is assessed

Task:
Studying the cross section of a dicot stem

- Topic: III (a)
  - transport of water and mineral;
  - physical nature of xylem [support in plant]
- Assessment area A:

(a) Investigative practical work
  - Free-hand sectioning skill
  - Skills in staining and making of temporary mount
  - General laboratory skills

(b) Microscopic examination

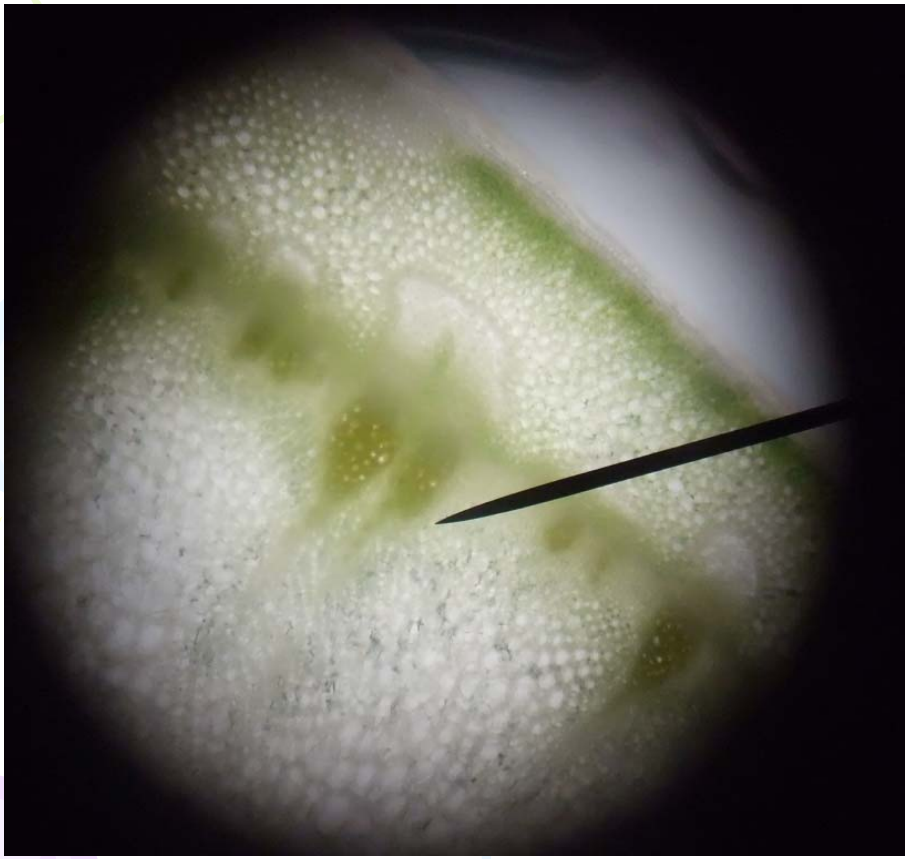
(e) Biological drawing

Task:
Studying the cross section of a dicot stem

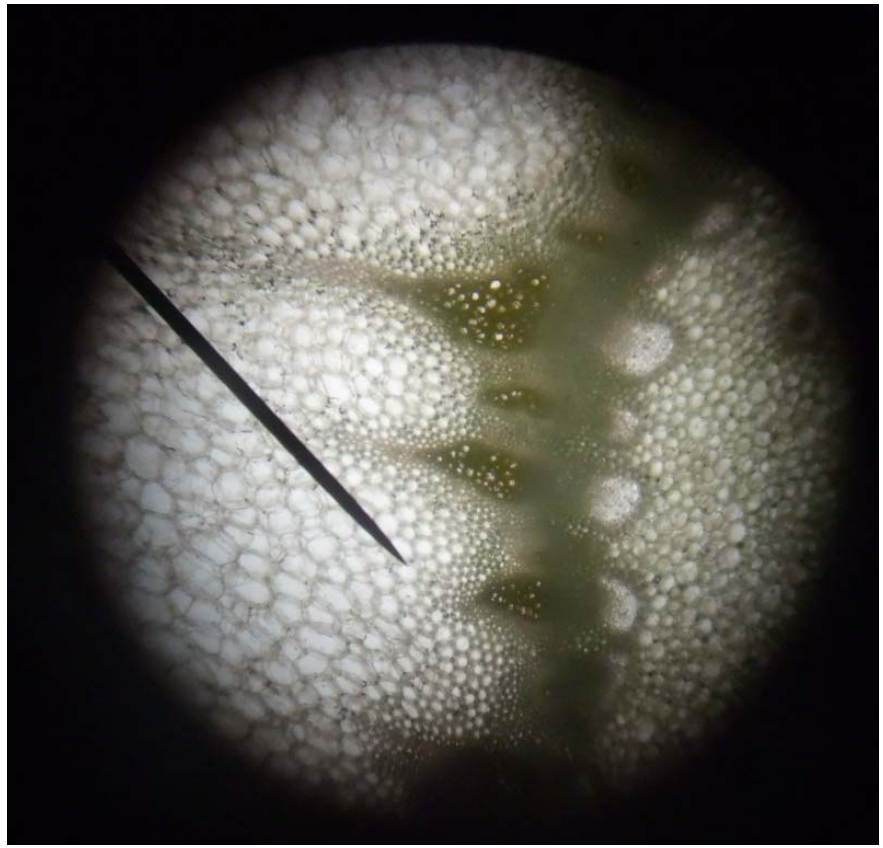
Introduction:

- Lignin is a complex aromatic compound and is usually found in the cell wall of some thick-walled cells (e.g. sclerenchyma, xylem vessels or tracheids) in plants.
- Lignin strengthens the cell wall and makes it impermeable to water and solutes.
- The location of the lignified cells in a young dicotyledonous stem can easily be identified by staining the cross section of the stem with aniline dye which stains lignin yellow.

Task:
Studying the cross section of a dicot stem



unstained



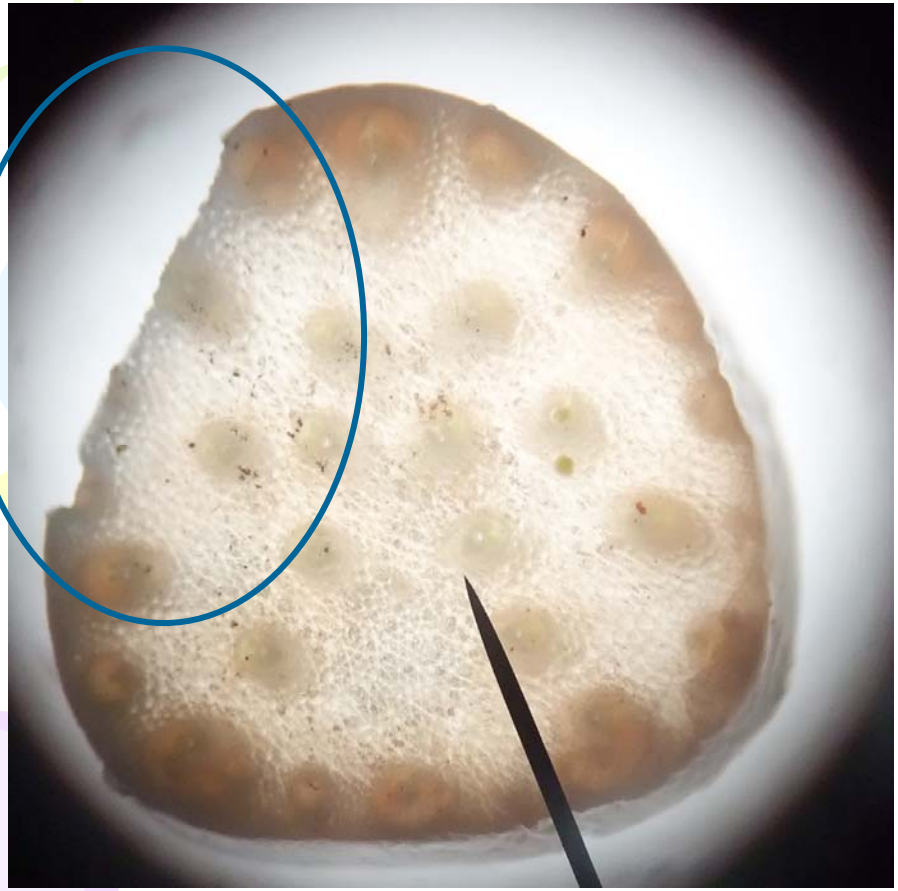
stained

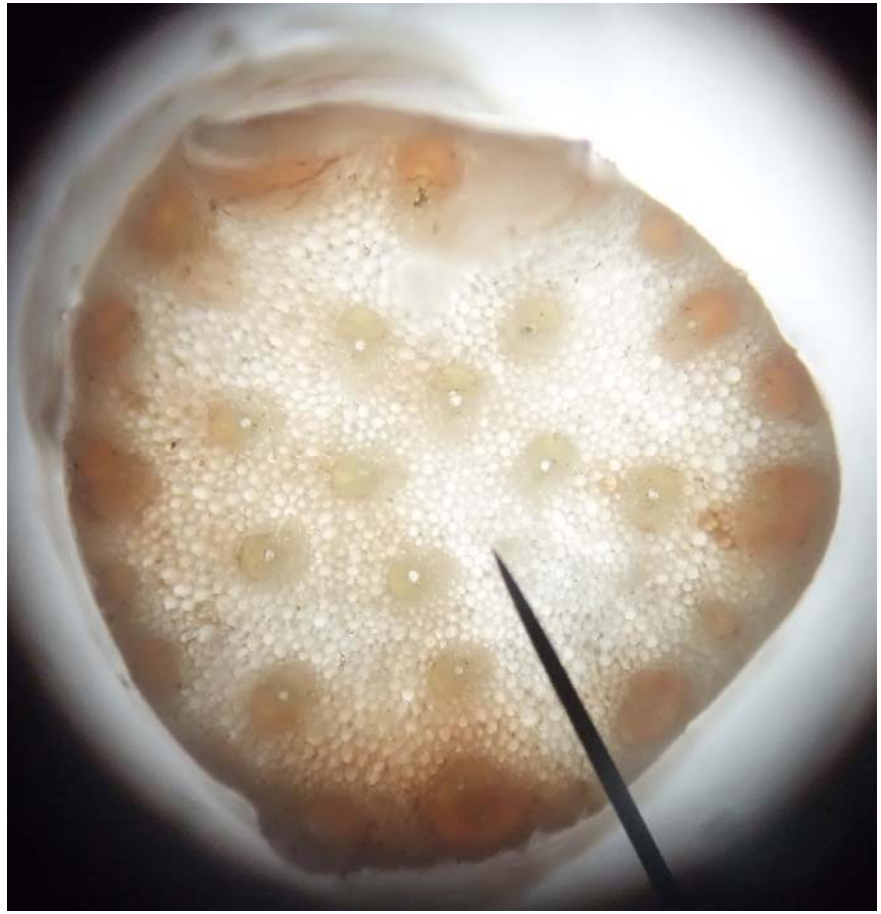
Task:
Studying the cross section of a dicot stem

Task:

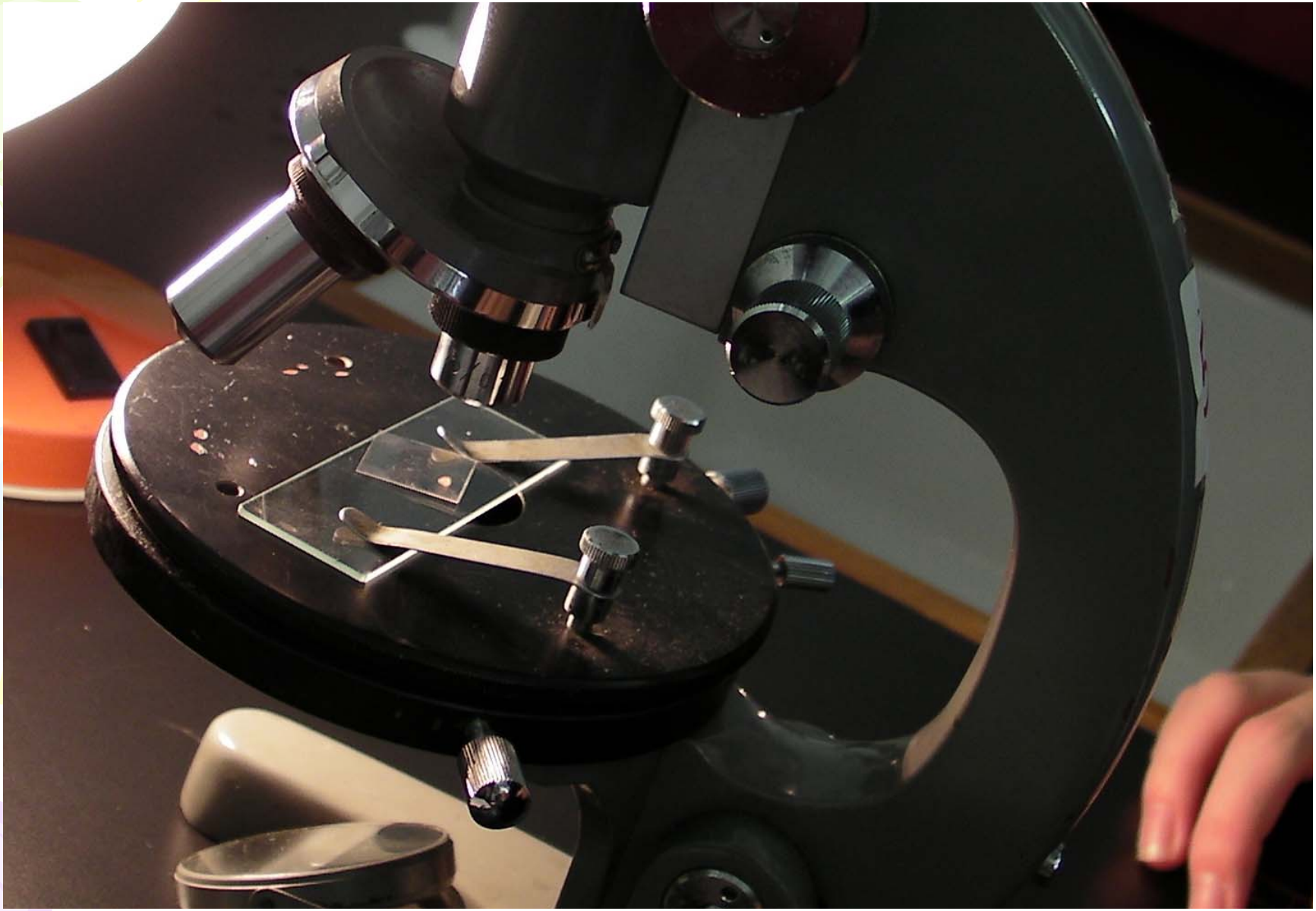
- Prepare thin sections of a young dicotyledonous stem for making temporary mounts for microscopic examination.
- *Draw a labelled low-power diagram to show the structure of the dicotyledonous stem. Identify the stained tissue(s) and briefly describe how the structure(s) of the stained tissue(s) is/are related to its/their functions. (The diagram can be used as an evidence for making accurate observation)*

Which section is better?



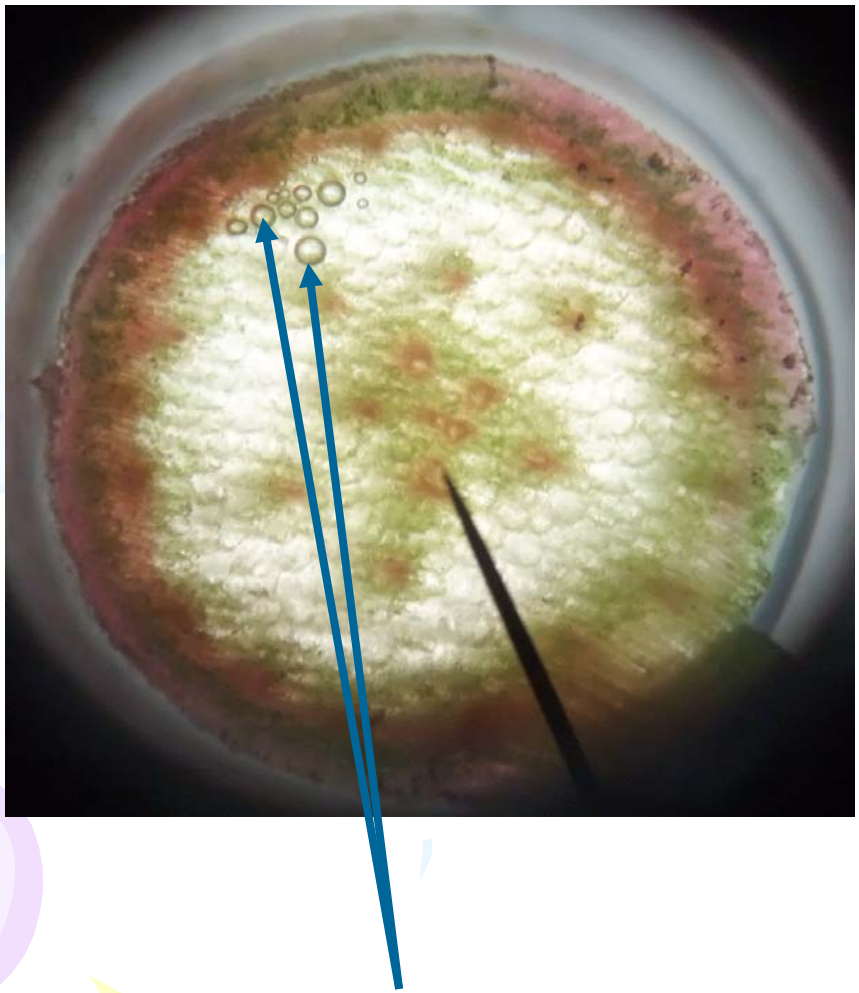


Incomplete section



Cover slip covering the whole section and is centrally placed ?

Which slide is better?



lots of air bubbles

Task:
Studying the cross section of a dicot stem

Criteria for assessing biological drawings:

(i) Accuracy of the drawing - resemblance to the specimen, distinctive biological features, proportion of various parts.

(ii) Smooth and clear lines, overall neatness.

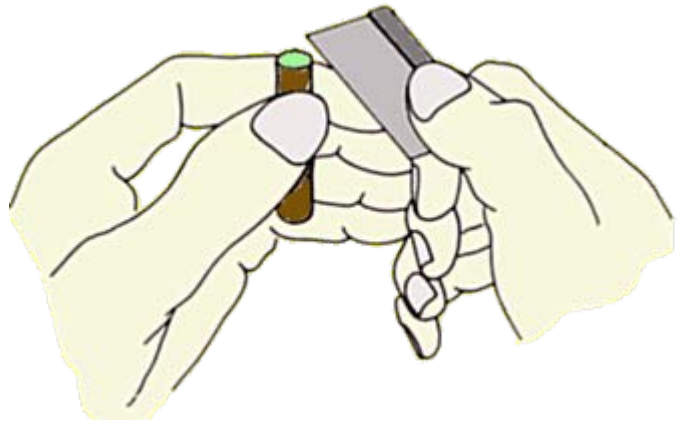
(iii) Labels, title and magnification.

(iv) Low-power diagram showing the locations of different tissues, no individual cells are shown in diagram.

(v) Identification of the stained tissue(s) and annotation on how the structure(s) of the stained tissue(s) is/are related to its/their functions (e.g. how the structure of the xylem helps in transporting water and providing support; how fibre provides support).

Task:
Studying the cross section of a dicot stem

Useful websites:



http://www.hkbiology.net/index.php/biology-experiment-technique-info/biology-prepare-microscopic-slide

Task:
Studying the cross section of a dicot stem

- **Safety precautions:**
  Aniline dye is toxic,
  - wear gloves when handling aniline to avoid its contact with skin;

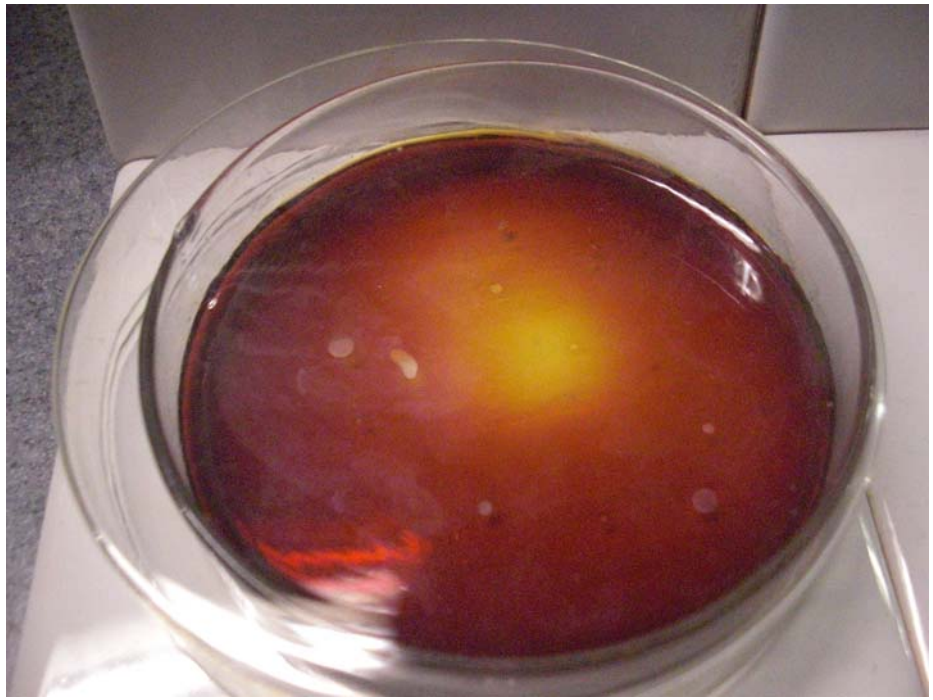
On handling of aniline:

Handbook on Safety in Science Laboratories (2002)

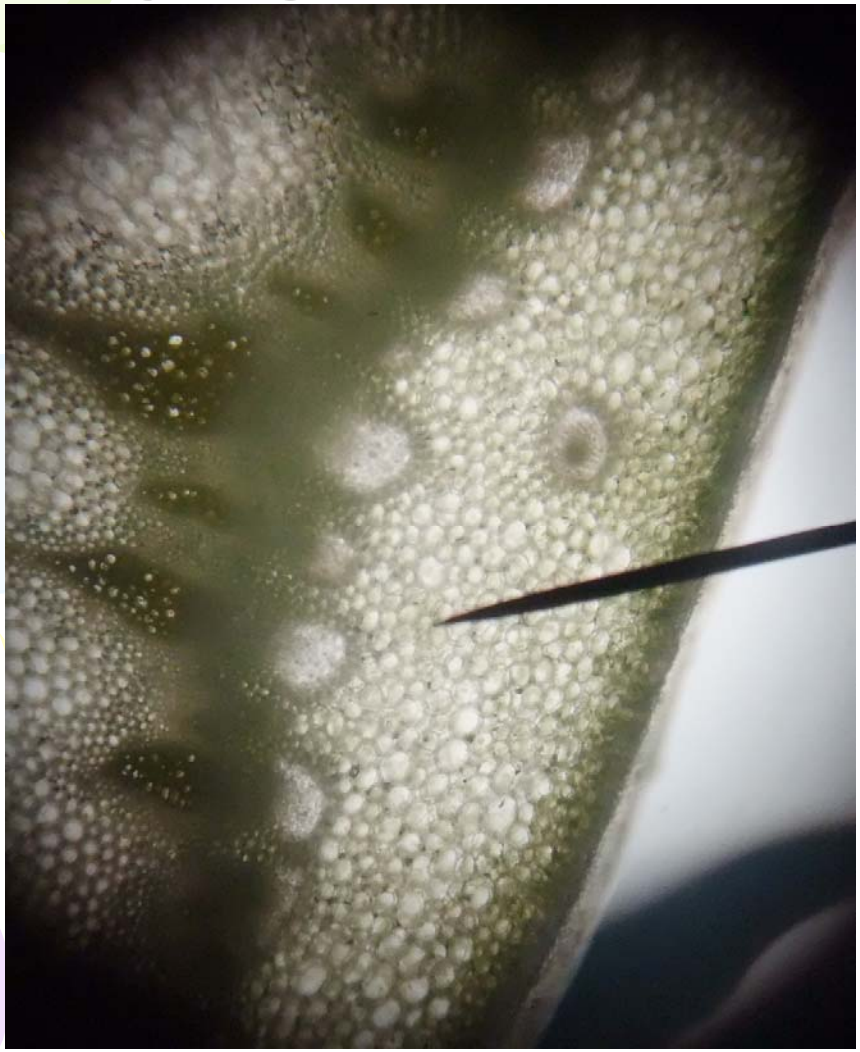
http://cd1.edb.hkedcity.net/cd/science/laboratory/safety/SHB_2002e.pdf

Task:
Studying the cross section of a dicot stem

- **Safety precautions:**
  Aniline dye is toxic,
  - cover the petri dish while staining the stem sections to avoid inhaling the fume; and
  - used aniline dye should be collected in a waste bottle for proper disposal.

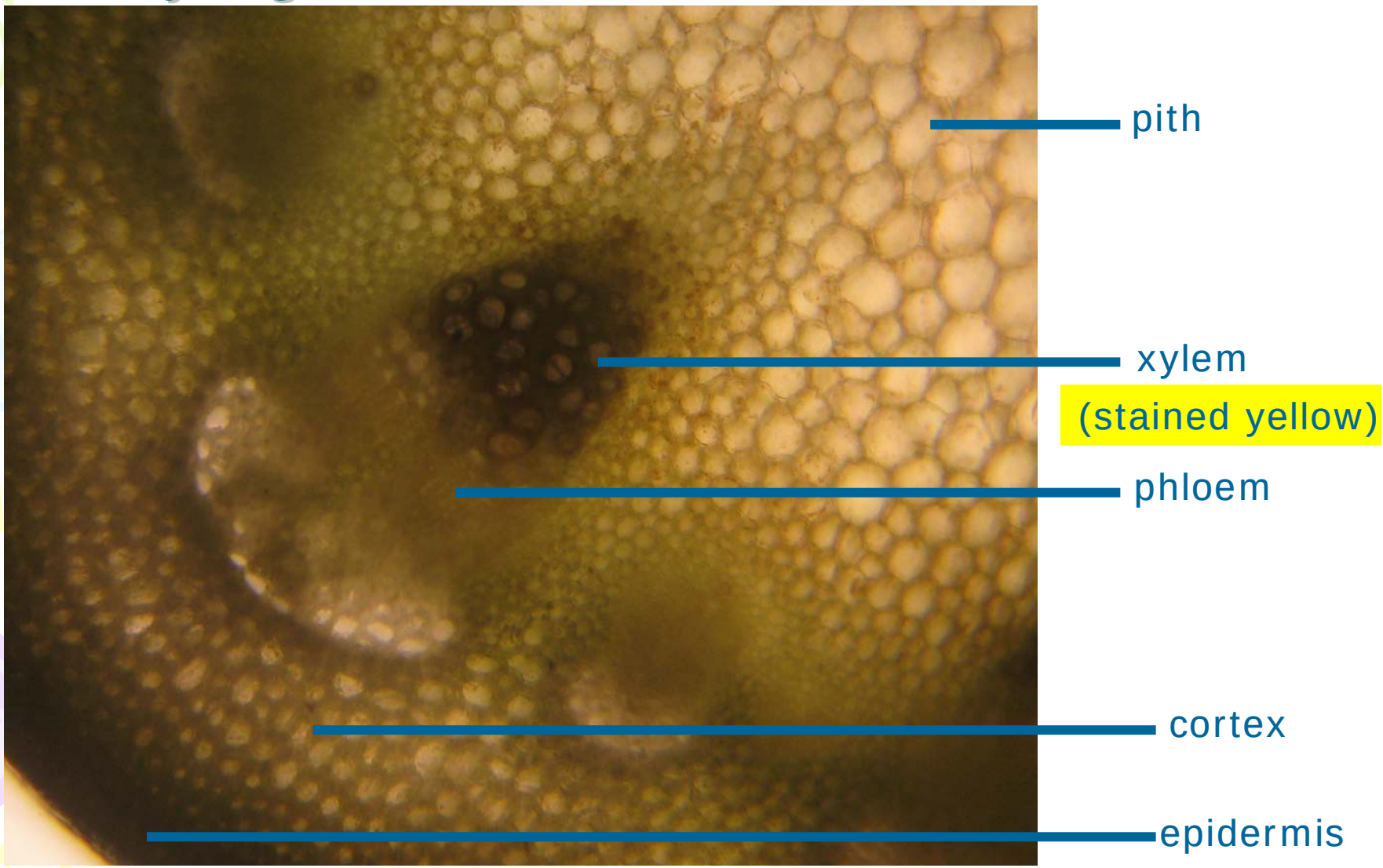


Task:
Studying the cross section of a dicot stem



Material used: choi sum

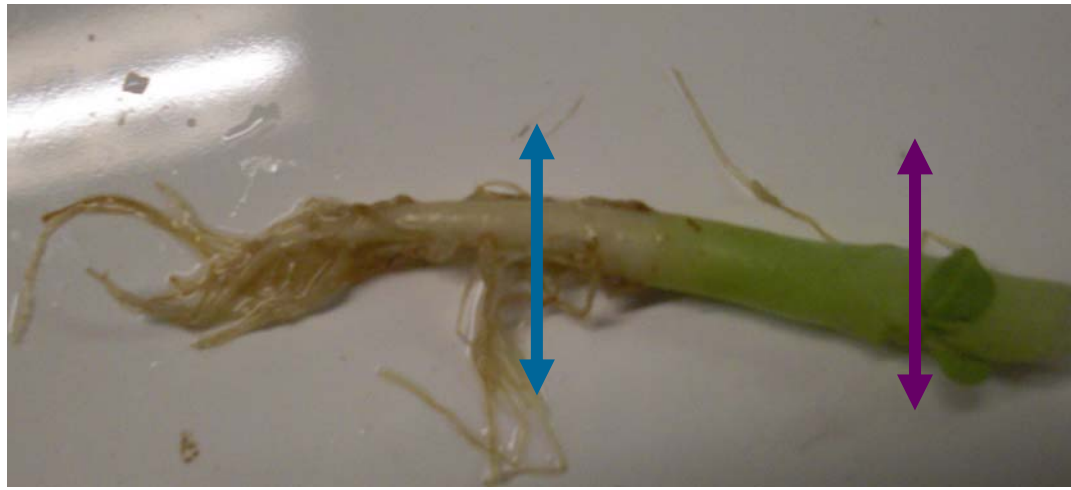
Task:
Studying the cross section of a dicot stem



Task:
Studying the cross section of a dicot stem

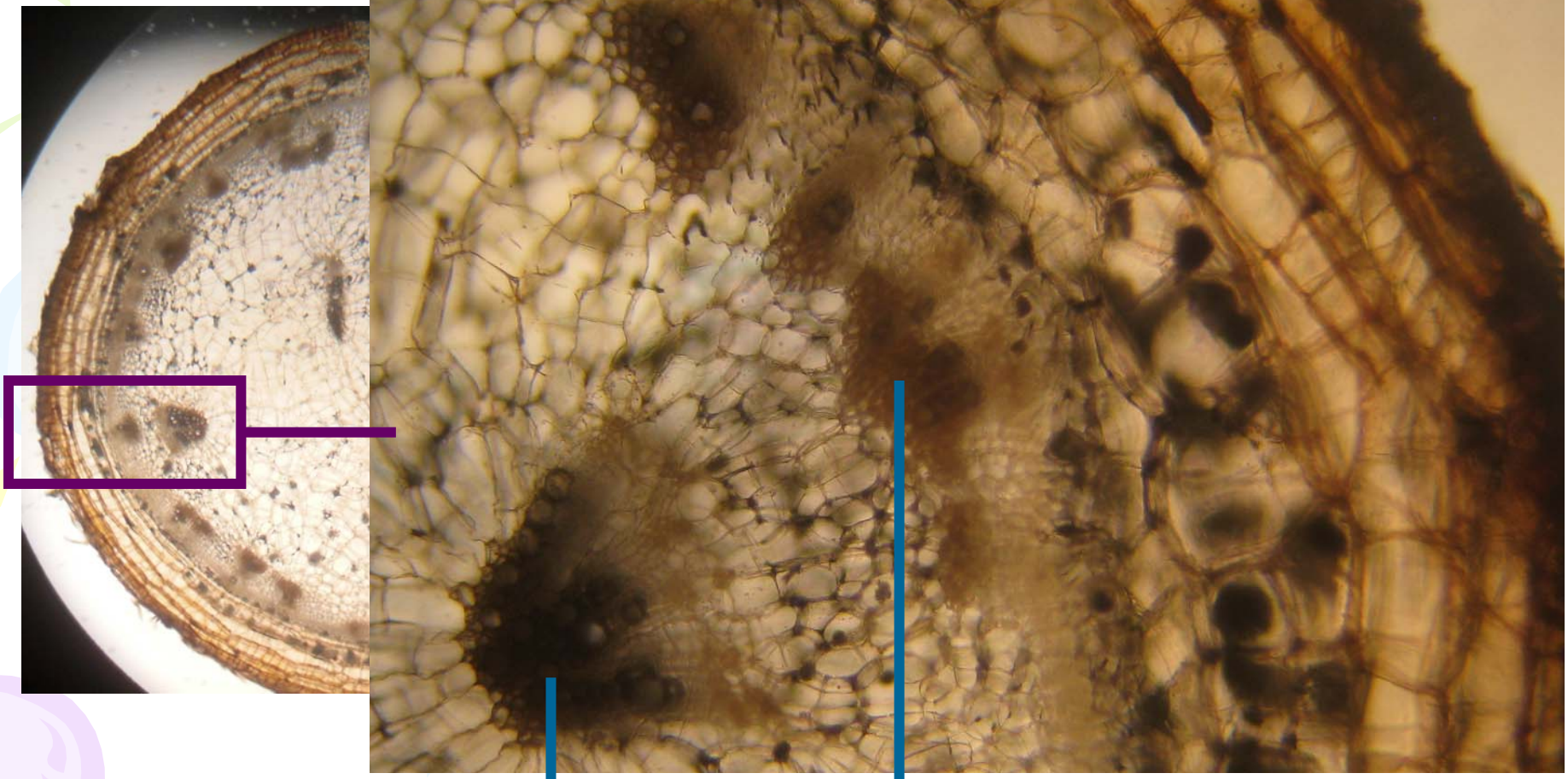
Further practical work:

Different parts of a plant – root & stem

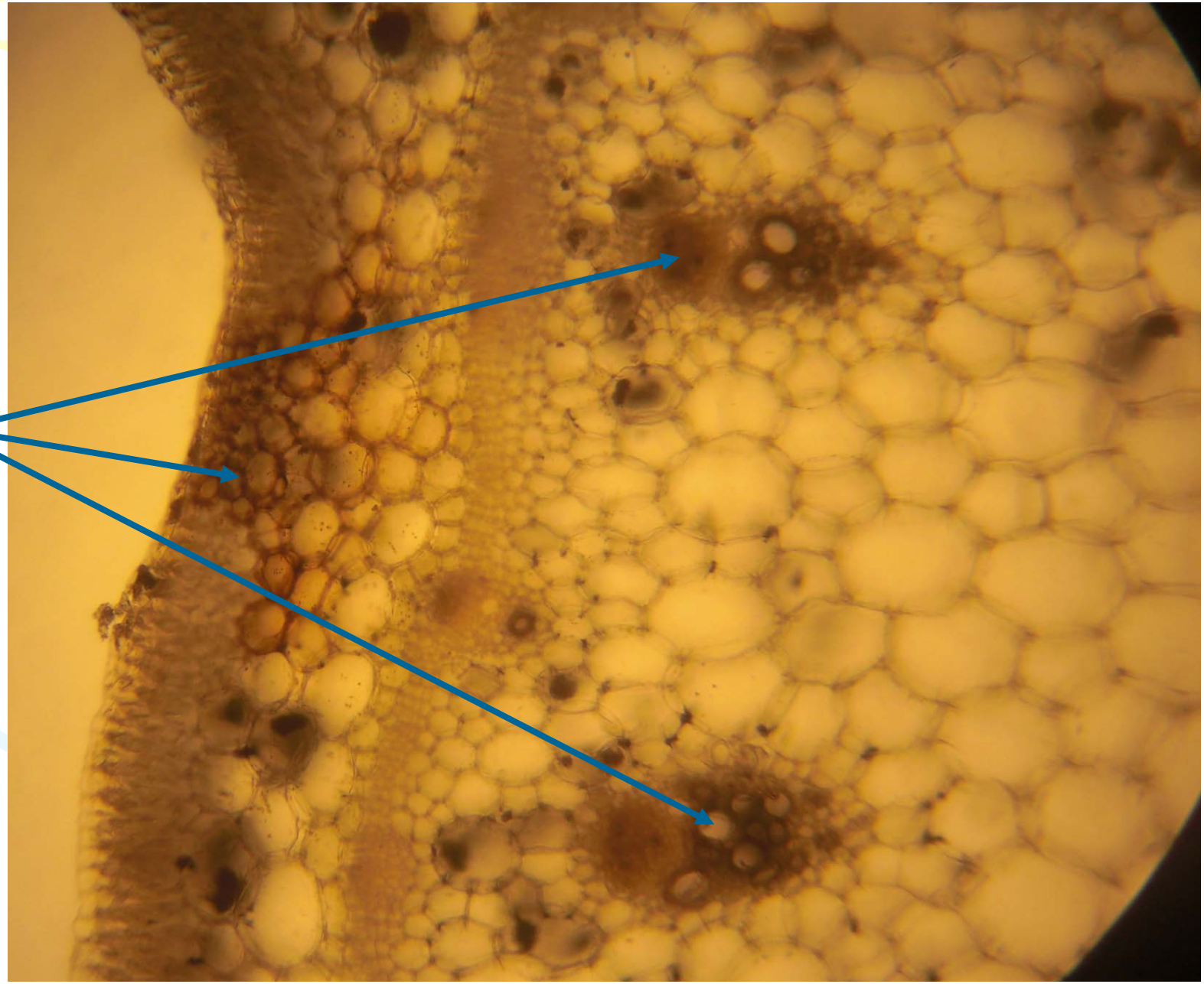


Amaranth

Root section

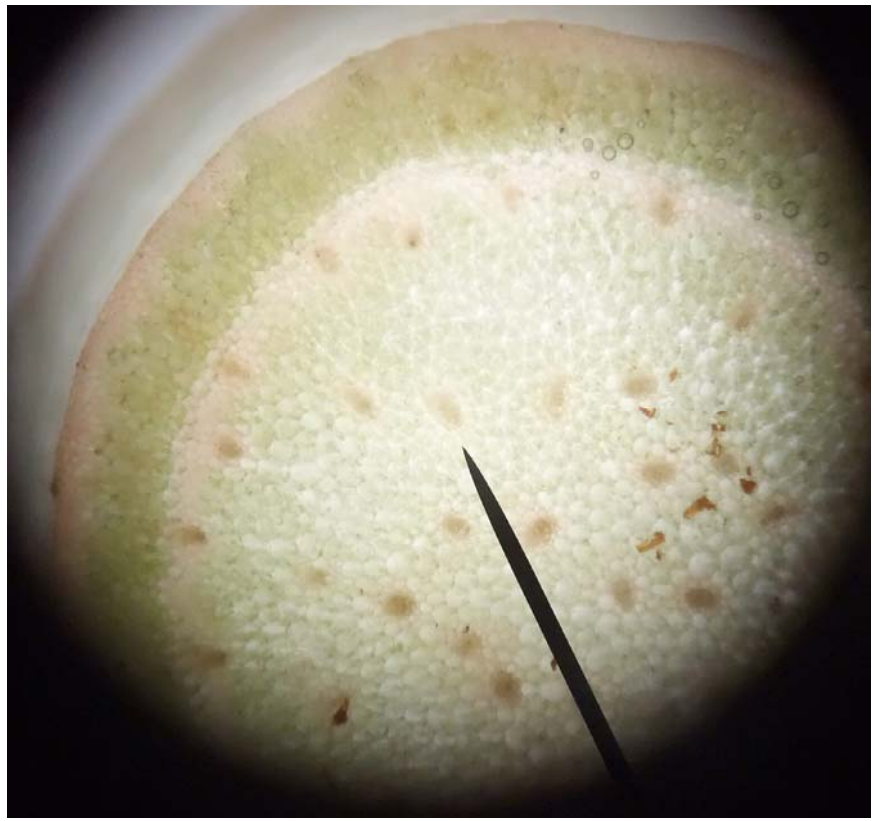


Stem section

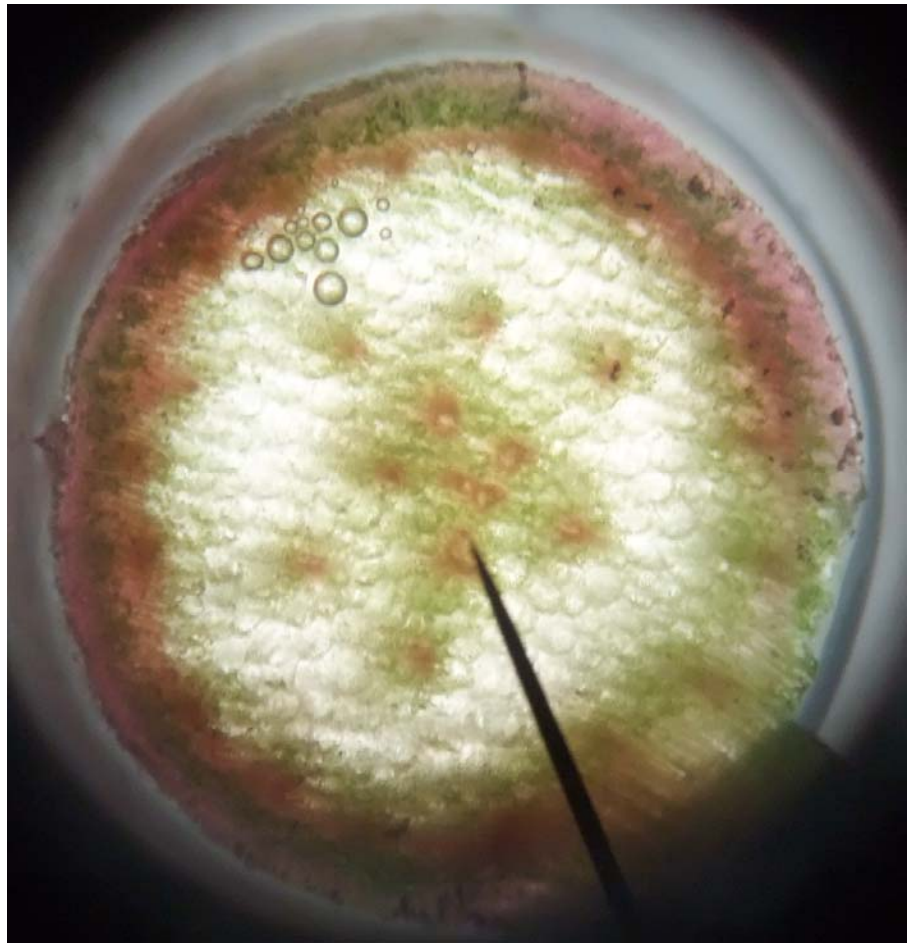


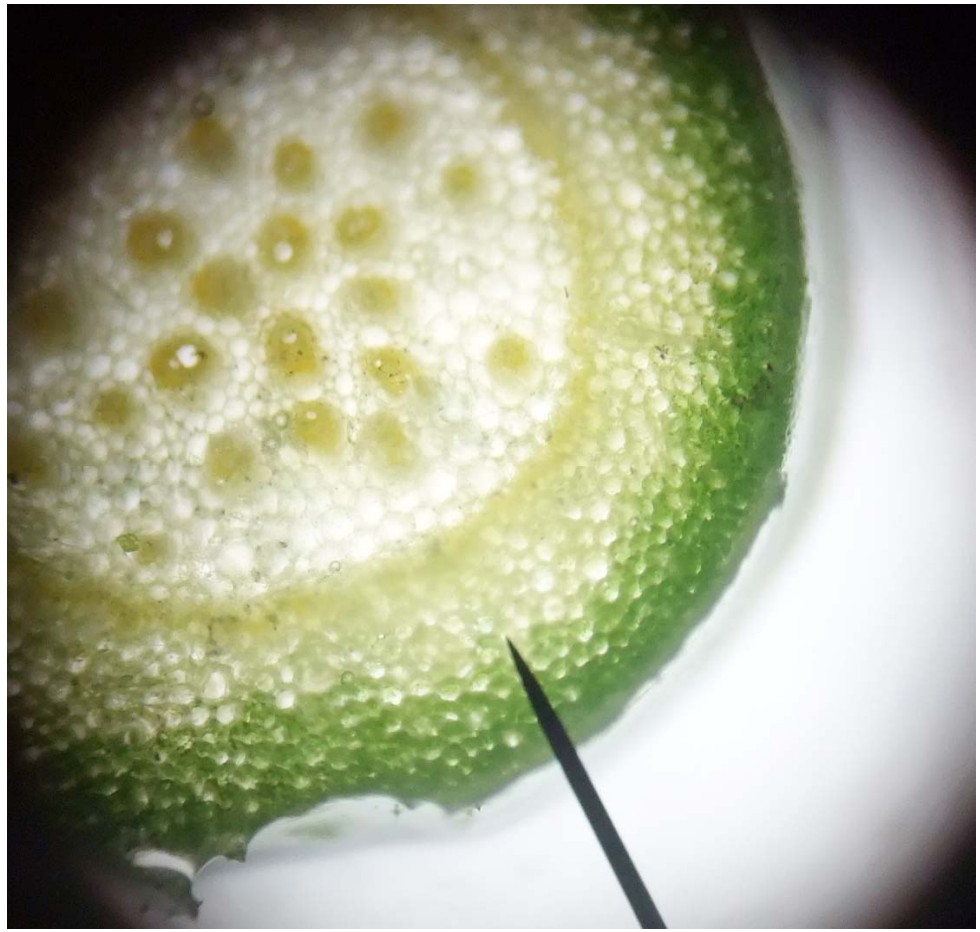
Further practical work:
Stem sections of different types of plants

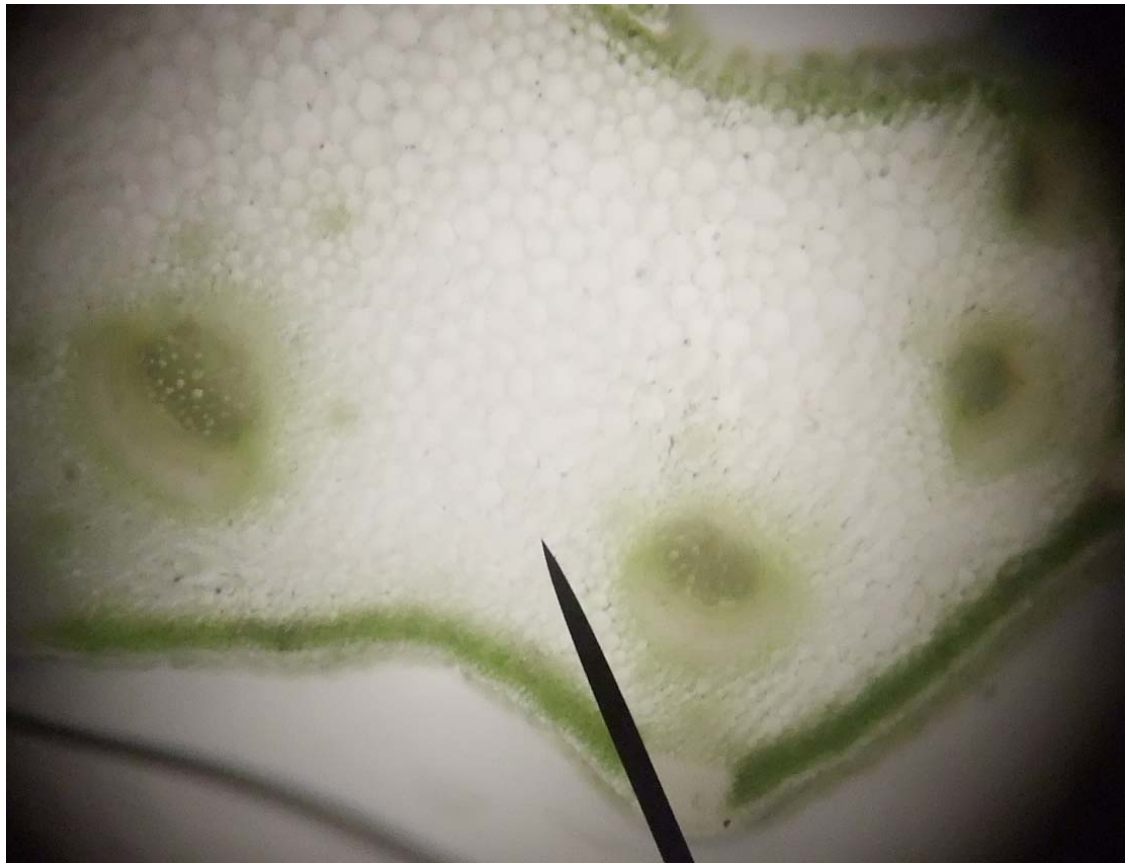
Rhoeo discolor

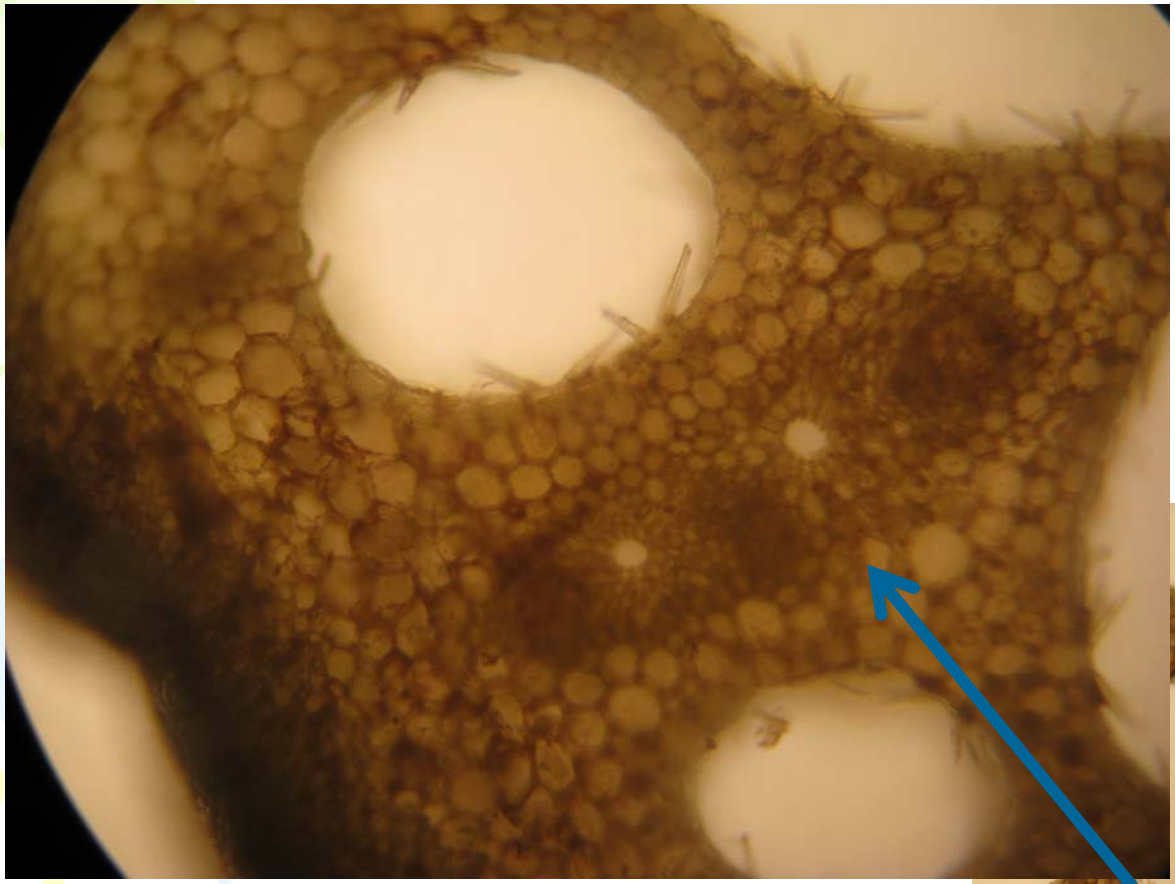


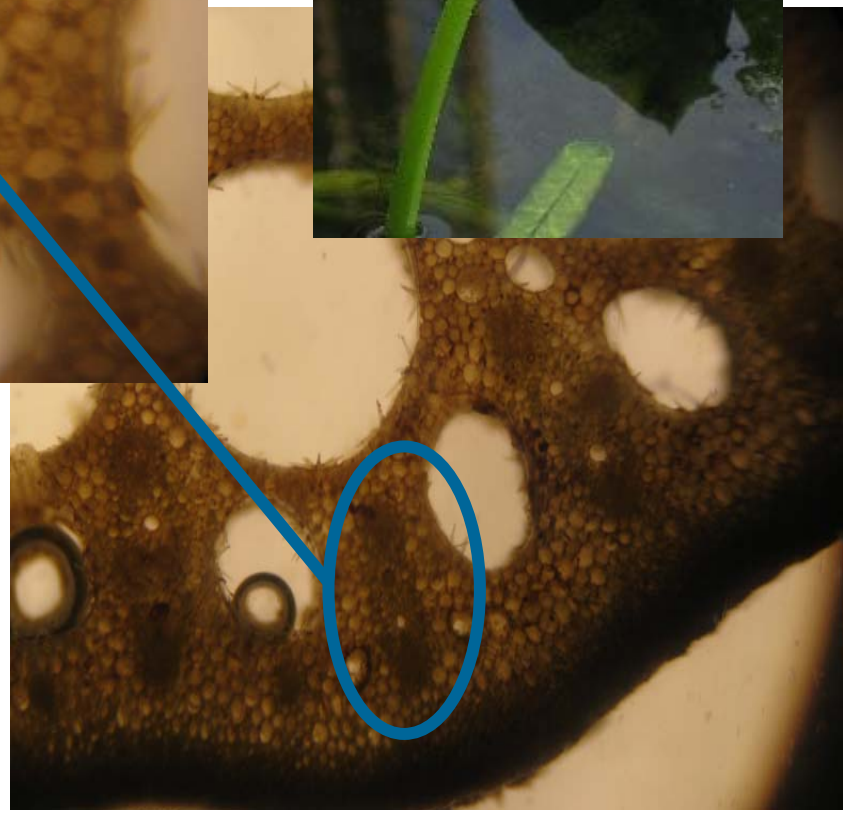
Zebrina





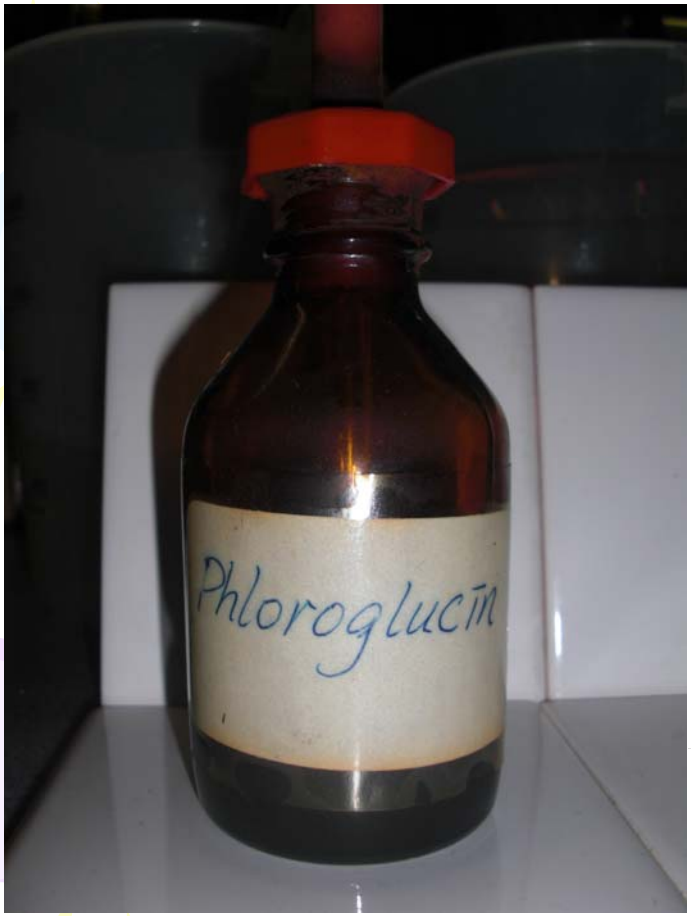






Task:
Studying the cross section of a dicot stem

Alternative stain: acidified phloroglucinol



List of Furniture and Equipment for 2 Secondary School

http://www.edb.gov.hk/FileManager/EN/Content_6082/ss%20combined%20public.xls

Chemicals/Reagents	Hazard Nature*	MSDS		Quantity in Standard F/E Lists for Sec Schools				
		CityU MSDS No.	Green Cross+	Chem (S4-5)	Chem (AL)	Bio (S4-5)	Bio (AL)	IS
Benzene-1,3,5-triol (Phloroglucinol)	(H)	459					25 g	
Phenylamine (Aniline)	T	012			500 mL			

Material Safety Data Sheet

City University of Hong Kong

MSDS **ANILINE** **0012**

http://scitec.uwichill.edu.bb/bcs/courses/Biology/BIOL2053/2053proj/biol2053sect.htm

Type (b) & Type (e) – assessment criteria

Type (b): Microscopic Examination

- Uniform and appropriate illumination has been achieved by means of suitable setting of the light source, mirror, condenser, filter and diaphragm as appropriate.
- Proper handling of observed specimens (wet or dry) is demonstrated.
- Correct choice and good use of eyepiece and objective is made for viewing specimens under low-power and high-power.
- Correct focusing procedure is used.
- Correct viewing practices and posture are demonstrated.

Type (e): Biological drawing

- Accuracy of the drawing - resemblance to the specimen, distinctive biological features, proportion of various parts.
- Smooth and clear lines, overall neatness.
- Labels, title and magnification.

Task: Skin & Body Defence

- Topic: IV (c)
  - non-specific defence mechanism : skin, mucus and...
- Assessment area A:

  (b) microscopic examination, OR / AND

  (e) biological drawing

Task: Skin & Body Defence

Introduction:

- Skin plays a role in non-specific defence as its structure provides both a physical and chemical barrier against pathogens.

Task:

- Observe under the microscope a vertical section of mammalian skin.
- Draw a labelled low-power diagram to show the structure of the skin and annotate the parts involved in body defence.

Type (b) & Type (e) – assessment criteria

Type (b): Microscopic Examination

- Uniform and appropriate illumination has been achieved by means of suitable setting of the light source, mirror, condenser, filter and diaphragm as appropriate.
- Proper handling of observed specimens (wet or dry) is demonstrated.
- Correct choice and good use of eyepiece and objective is made for viewing specimens under low-power and high-power.
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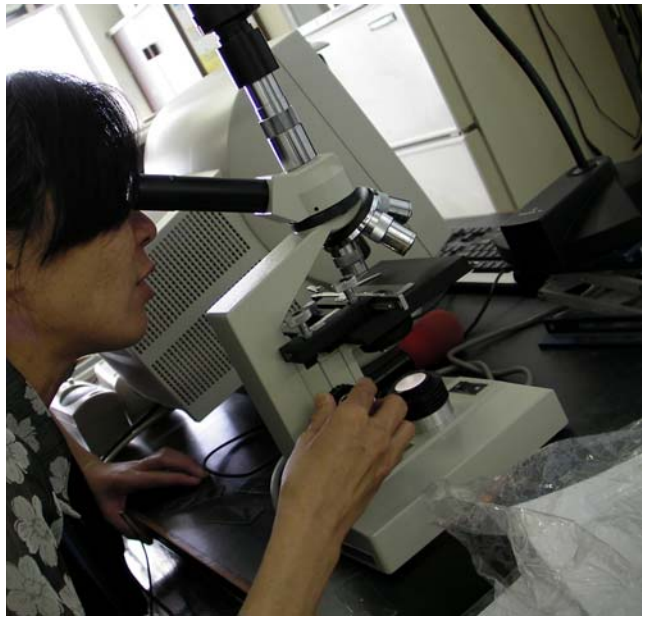


Task: Skin & Body Defence

Criteria for assessing biological drawings:

(i) Accuracy of the drawing - resemblance to the specimen, distinctive biological features, proportion of various parts.

(ii) Smooth and clear lines, overall neatness.

(iii) Labels, title and magnification.

(iv) Low-power diagram showing the locations of different tissues, no individual cells are shown in the diagram.

(v) Identification of the parts of the skin involved in body defence and annotation of how these parts help in body defence.

Type (c) & Type (e) – assessment criteria

Type (c): Dissection of animal / animal organ

- Good manipulative skills are demonstrated.
- Effective use of dissecting instruments is observed during the course of dissection.
- Relevant structures are clearly displayed.
- Structures are intact, clearly visible and free from surrounding overlying tissue.
- Dissection is generally neat and tidy. No debris is scattered in the dish or on the board.

Type (e): Biological drawing

- Accuracy of the drawing - resemblance to the specimen, distinctive biological features, proportion of various parts.
- Smooth and clear lines, overall neatness.
- Labels, title and magnification.

Task: Breathing system of a rat

- Topic: III (b)
  - General plan of breathing system
  - Mechanism of ventilation
- Assessment area A:

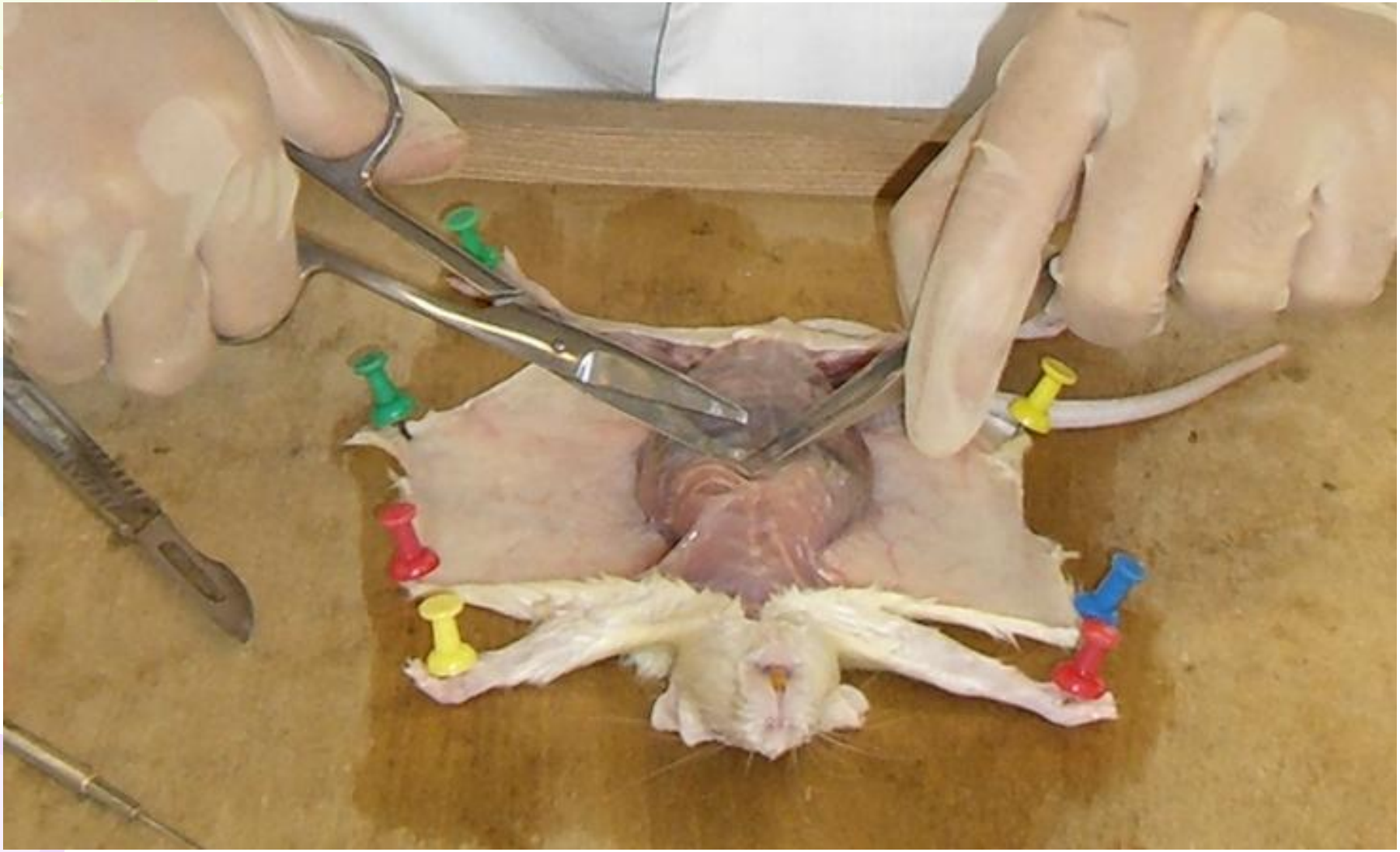
  (c) dissection of animal, OR / AND

  (e) biological drawing

Task: Breathing system of a rat

Task:

- Dissect the rat provided to display:
  - the organ where gas exchange takes place;
  - the path through which air passes from outside into the organ for gas exchange;
  - the muscles and the structures involved in the breathing action.
- *Draw a labelled diagram of the dissected rat to show the organs, muscles and structures referred to in 1 to 3.* *(The diagram can be used as an evidence for making accurate observation)*



Which dissection is better?

THANK YOU